

Mr. John W. James, Riley, Ill. : no sun spots were seen till the 25th, then a group about 43,000 miles long, a little west of the sun's meridian, disappearing by solar rotation on the eve of the 30th. A single spot about 16,000 miles diameter found three days east of the sun's meridian on the 30th.

Mr. M. A. Veeder, Lyons, N. Y. : on December 12th a spot of considerable size was at the western limb, and some faculae were near the eastern limb. 20th, a train of spots had formed nearly in the location of the faculae that appeared by rotation on December 12th. These spots faded out and the faculae in their location disappeared by rotation on the 24th. On the 20th a spot of considerable size was seen near the eastern limb; this spot had nearly faded out on December 22d, but on the 23d it increased again and was seen on the 25th, 26th, and 27th, followed by a train of smaller spots, which faded out before reaching the western limb. 26th, a large spot appeared by rotation and was seen on the 27th, 29th, and 31st. Observation was poor on many days in this month.

Mr. H. D. Gowey, North Lewisburgh, Ohio : sun spots 12th, 19th, 20th, 21st, 25th to 28th, 30th, and 31st.

MIRAGE.

Mirage were observed as follows: 1st, 4th, and 5th, Marquette, Nebr. 6th, Hampton, Iowa, and New England City, N. Dak. 11th, Bancroft, Iowa. 12th, Marquette, Nebr. 13th, Hampton, Iowa. 14th, Marquette, Nebr.; Woonsocket and Webster, S. Dak. 15th, Woonsocket and Webster, S. Dak. 16th and 17th, Hampton, Iowa, and Woonsocket, S. Dak. 22d, Webster, S. Dak. 26th, Marquette, Nebr.; Woonsocket and Webster, S. Dak. 27th, Marquette, Nebr., and Wolsey, S. Dak. Spearfish, S. Dak. : a fine mirage was observed on the morning of the 8th. The high lands along the Belle Fourche were lifted into plain view, and, though twenty miles away, seemed but a mile or two distant. It lasted for more than an hour, beginning with the first rays of the morning sun.

Huron, S. Dak. : a singular, fine mirage was observed soon after daylight on the 22d, and lasted for about one hour. A range of hills covered with snow was seen at a distance of four miles east of this place. The projecting white mountain peaks, with intervening white spaces, composed of lakes, covered with ice, were plainly seen.

VERIFICATIONS.

FORECASTS FOR 24 HOURS IN ADVANCE.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Division.]

The forecasts for districts east of the Rocky Mountains for December, 1889, were made by Captain James Allen, 3d Cavalry, Signal Officer, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, December, 1889.

States.		States.	
Maine.....	79.2	Kentucky.....	87.0
New Hampshire.....	83.6	Ohio.....	84.1
Vermont.....	81.7	West Virginia.....	80.9
Massachusetts.....	82.7	Indiana.....	84.3
Rhode Island.....	85.3	Illinois.....	83.6
Connecticut.....	84.3	Lower Michigan.....	82.9
Eastern New York.....	85.2	Upper Michigan.....	77.4
Western New York.....	77.7	Wisconsin.....	83.5
Eastern Pennsylvania.....	84.1	Minnesota.....	80.1
Western Pennsylvania.....	80.5	Iowa.....	83.4
New Jersey.....	88.2	Kansas.....	82.3
Delaware.....	87.7	Nebraska.....	78.2
Maryland.....	85.5	Missouri.....	83.5
District of Columbia.....	85.0	Colorado.....	79.7
Virginia.....	84.5	North Dakota.....	83.7
North Carolina.....	87.4	South Dakota.....	80.8
South Carolina.....	85.8	Southern California*.....	85.9
Georgia.....	88.7	Northern California*.....	90.6
Eastern Florida.....	93.6	Oregon*.....	81.8
Western Florida.....	95.4	Washington*.....	80.7
Alabama.....	91.1	By elements: Weather.....	85.8
Mississippi.....	92.3	Temperature.....	83.0
Louisiana.....	91.2	Monthly percentage of weather and temperature combined †.....	84.7
Texas.....	89.0		
Arkansas.....	85.1		
Tennessee.....	83.2		

* In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. † The forecasts of temperature in districts east of the Rocky Mountains for December, 1889, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day. ‡ The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

FORECASTS FOR 48 AND 72 HOURS IN ADVANCE.

Appreciating the great importance that long time predictions possess for the general public the Chief Signal Officer has authorized forecasts for forty-eight and seventy-two hours, covering the second and third days in advance. Such forecasts are optional with the predicting officer, and are only

made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications of forecasts made for second day in advance. Number of predictions made: weather, 158; temperature, 92. Percentages of verifications: weather, 74.5; temperature, 84.9. Weather and temperature combined, 78.7.

Percentages of verifications of forecasts made for third day in advance. Number of predictions made: weather, 34; temperature, 7. Percentages of verifications: weather, 79.4; temperature, 78.6; weather and temperature combined, 79.0.

CAUTIONARY SIGNALS FOR DECEMBER, 1889.

Statement showing percentages of justifications of wind signals for the month of December, 1889:

Wind signals.—(Ordered by Captain James Allen.) Total number of signals ordered, seventy-one; justified as to velocity, wholly, fifty, partly, five; justified as to direction, sixty-two. Of the signals ordered, forty-nine were cautionary, of which thirty-five were wholly, and one partly, justified; and twenty-two were storm signals, of which fifteen were wholly, and four partly, justified. Thirty signals were ordered for easterly winds, of which twenty-two were justified, and forty-one were ordered for westerly winds, of which forty were justified. Percentage of justifications, 68.6.

Cold-wave signals.—(Ordered by Assistant Professor T. Russell.) Total number of signals ordered, two hundred and twenty-one; justified, one hundred and eighteen. Percentage of justifications, 53.4.

Percentages of local verifications of weather and temperature signals reported by directors of the various State Weather Services for December, 1889.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois.....	72.1	80.4	New Jersey.....	80.1	92.2
Indiana.....	82.0	83.0	New York.....	82.6	86.3
Kansas.....	82.2	83.9	Ohio.....	88.0	82.0
Michigan.....	86.9	86.7	Pennsylvania.....	80.0	87.0
Minnesota.....	71.0	77.0	South Carolina.....	91.9	92.0
Missouri.....	76.0	79.0	Tennessee.....	82.7	78.9
Nebraska.....	82.7	88.1			

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for December, 1889, of the directors of the various state weather services: